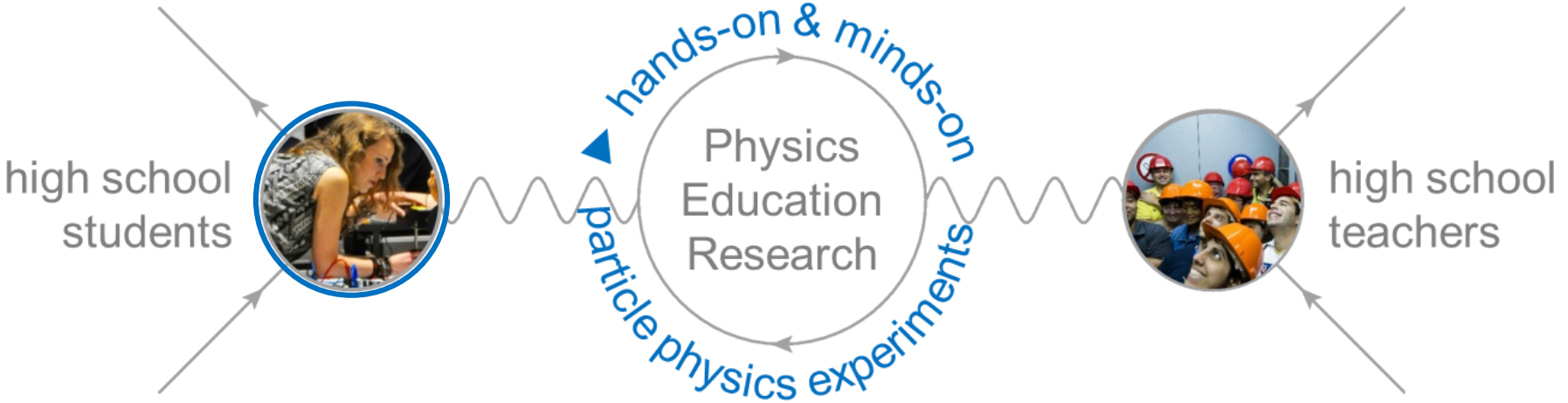
Idea Circle Dinner Discussion #3 | cern.ch/s-cool-lab | 17 April 2019 IdeaSquare, CERN

S'Cool LAB: From hands-on learning activities to questionnaires and escape games


high school
students
hands-on & minds-on
Physics
Education
Research
particle physics experiments
high school
teachers

Current opportunities

Cloud Chamber WS

A 90-minute hands-on particle physics workshop for high school students (aged 14 and above) and high-school teachers.

6370 participants in 2018
(5420 students & 950 teachers)

S'Cool LAB PLUS+

A half-day programme for high school students (aged 16-19) which includes cloud chambers,
+ one additional experiment,
+ participation in PER projects.

650 participants in 2018

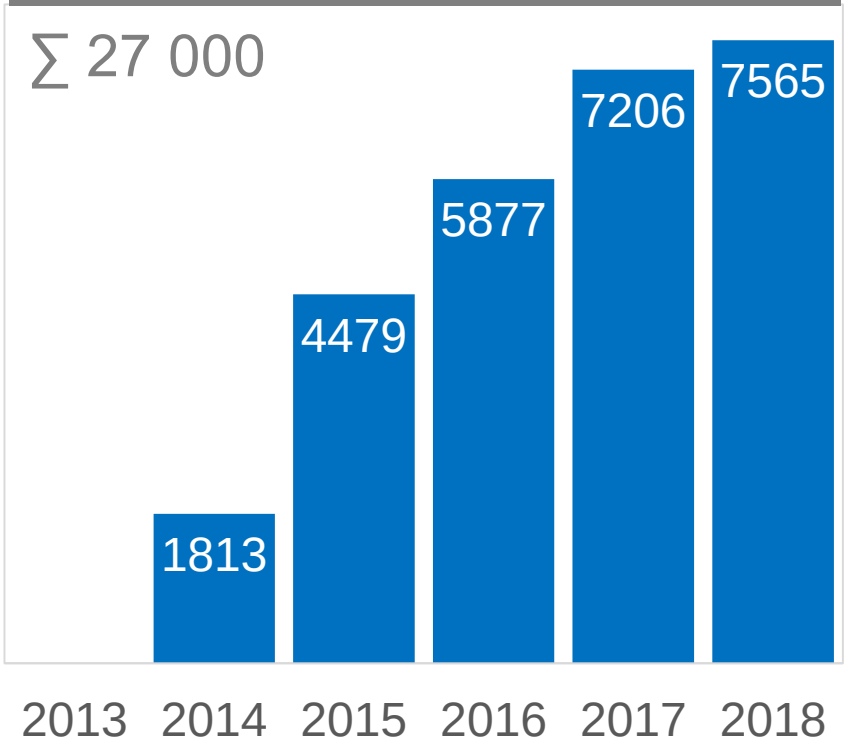
Summer CAMP

A two-week residential particle physics summer camp for 30 high school students aged 16-19 from all around the world.

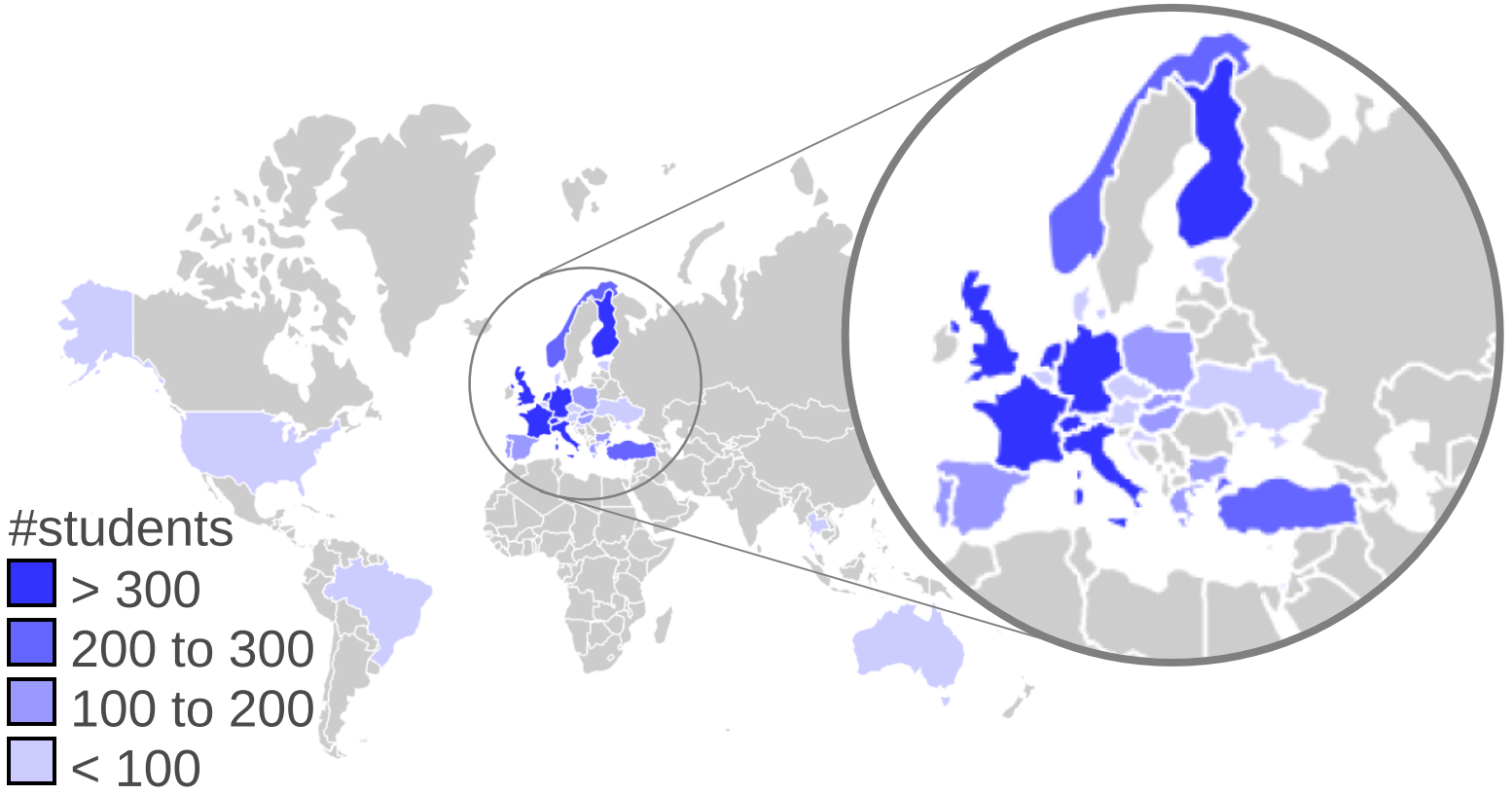
2nd camp in 2018 (24/07 – 04/08)

S’Cool LAB participants

Participants per year



Student participants per country (2017)



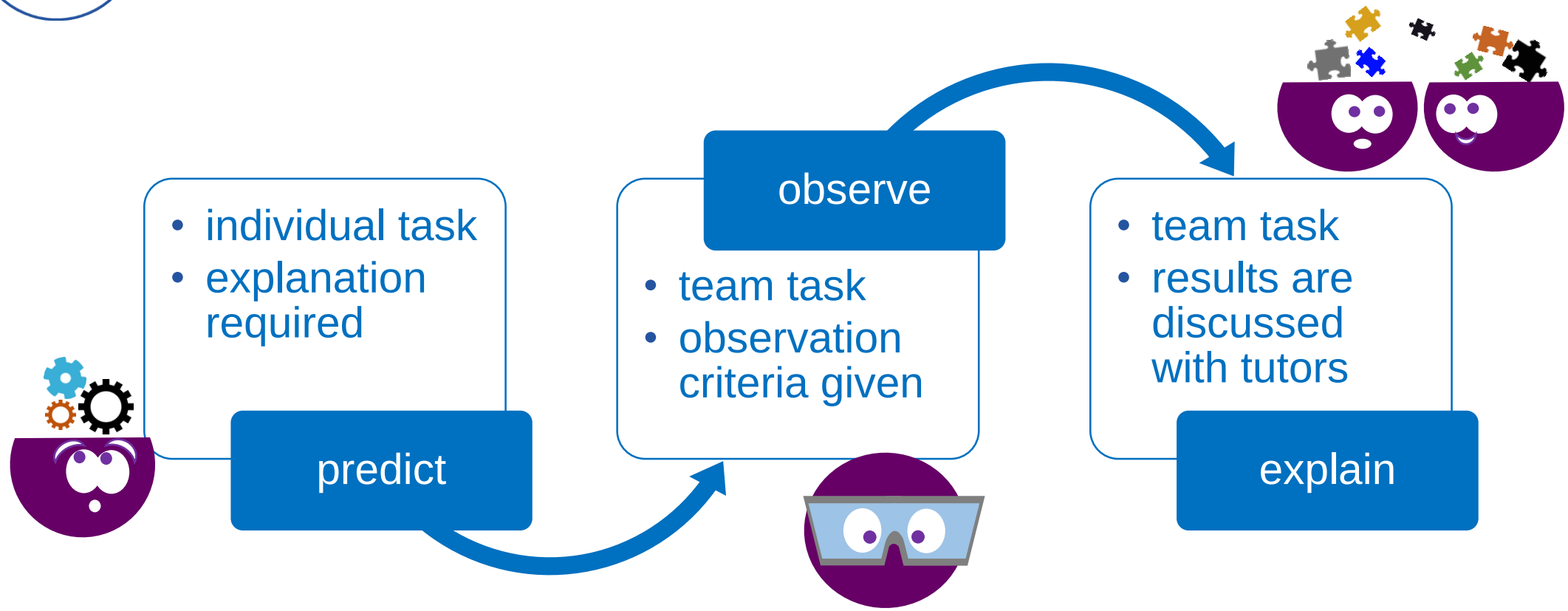
Development of S’Cool LAB
Activities

Hands-on experiments in the fields of particle detection, acceleration and medical applications to make CERN’s physics understandable

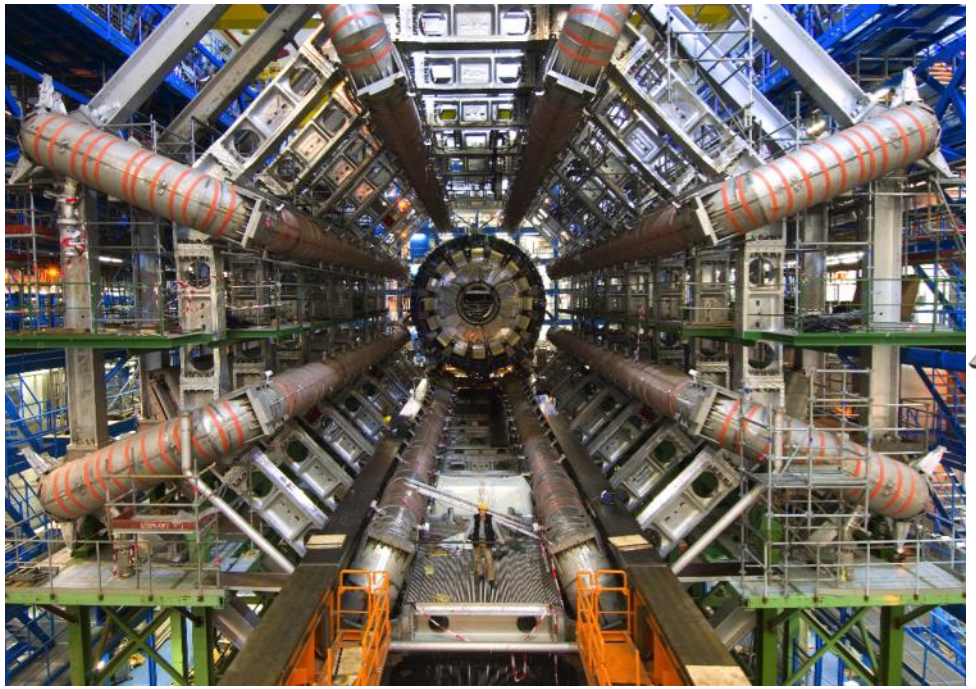
cloud chambers	electrons & magnetic fields	X-ray machines	super-conductivity	particle traps	positron emission tomography
					

Development of S'Cool LAB
Activities

Minds-on experimental tasks structured in POE cycles
(White & Gunstone, 1992) to keep students cognitively active

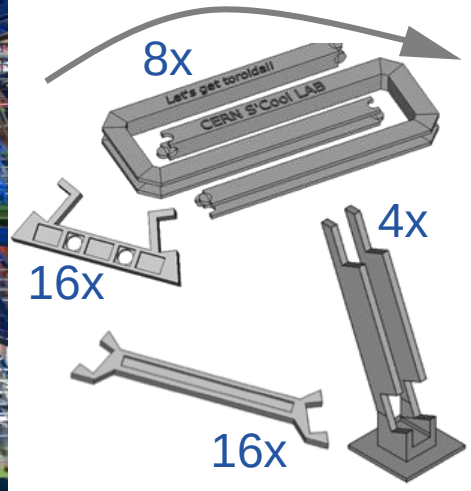


A 3D printable ATLAS magnet model

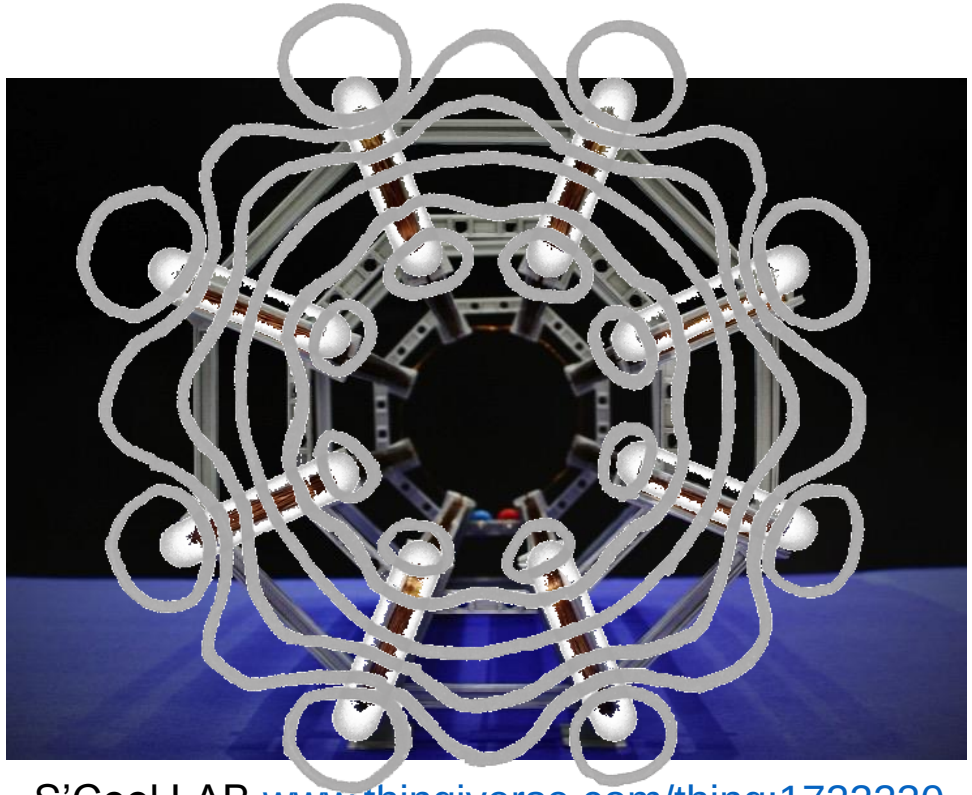


(Image: CERN)

FreeCAD 0.16
scaled 1:100



+500 m copper wire



S'Cool LAB www.thingiverse.com/thing:1722230

PARTICLE IDENTITIES

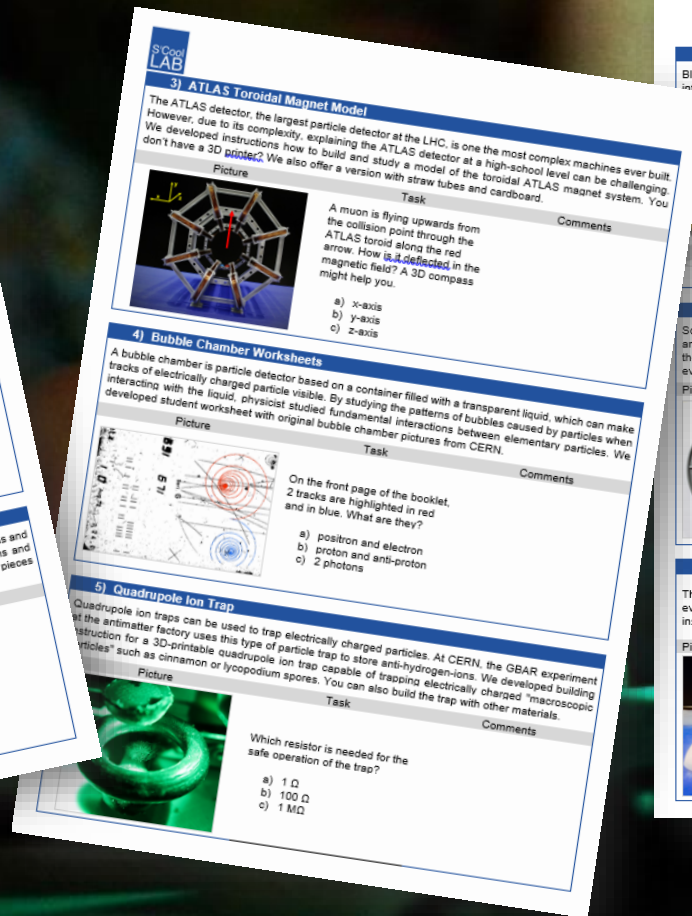
Réponds à 7 questions et découvre quelle particule élémentaire te correspond le mieux !

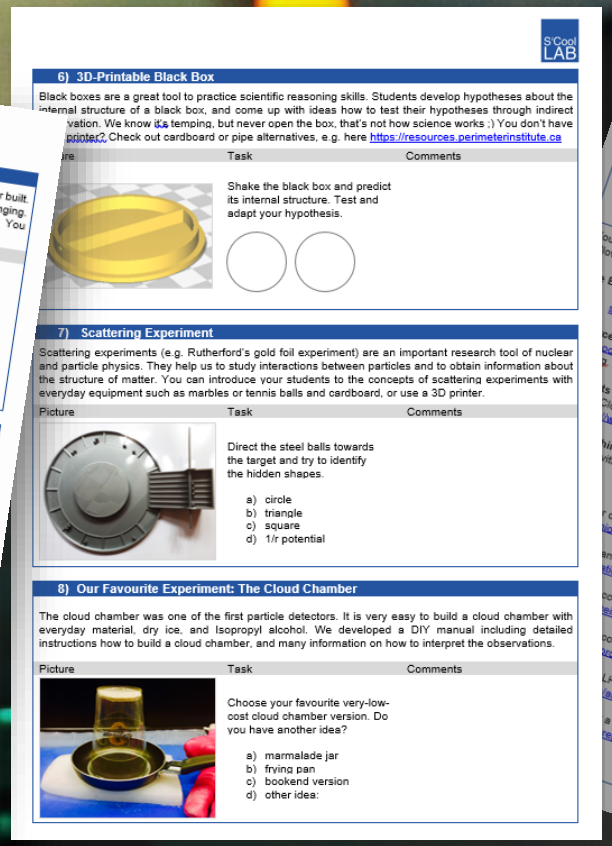
Answer 7 questions & find out which particle best fits your personality!

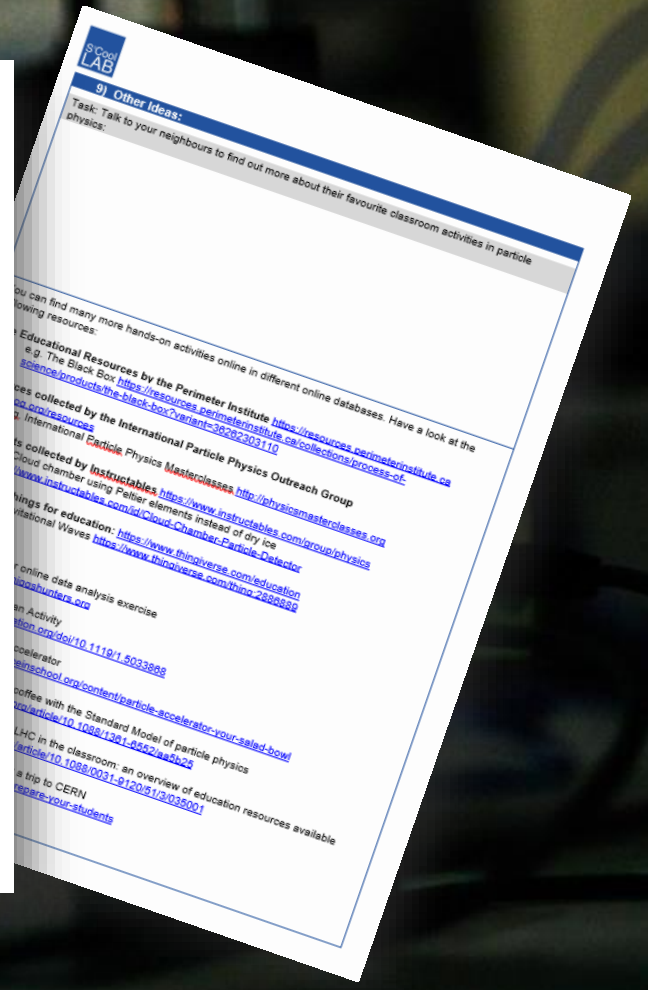
► cern.ch/identities

A hands-on tour through particle physics on a small budget

https://scool.web.cern.ch/classroom-activities

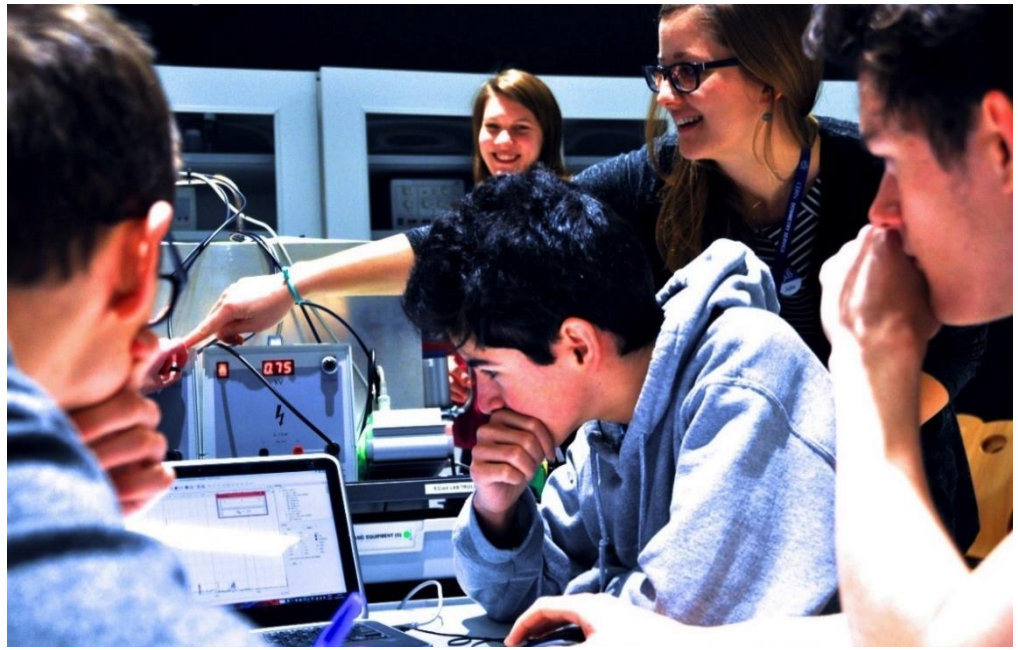




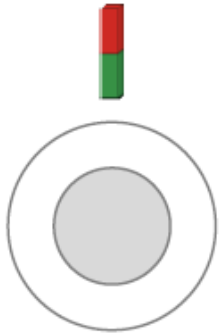
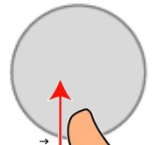
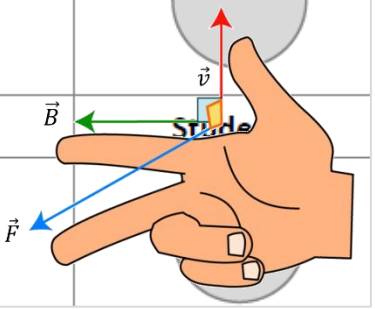


Development of S'Cool LAB
Activities

Hearts-on interactions through challenging group work and diverse CERN volunteers (42% female) including Q&A with potential role models

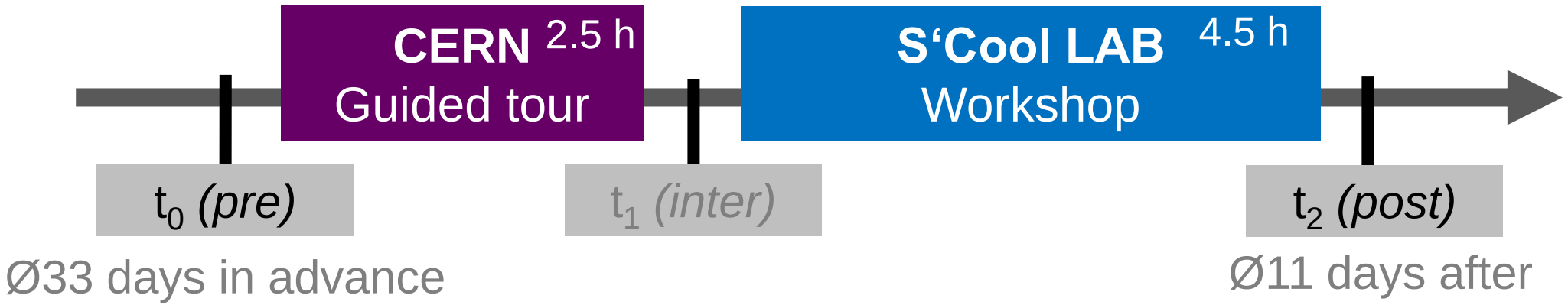


Prediction: Mark your prediction for the position of the beam spot with a **cross ✗** for the 3 magnet positions below.

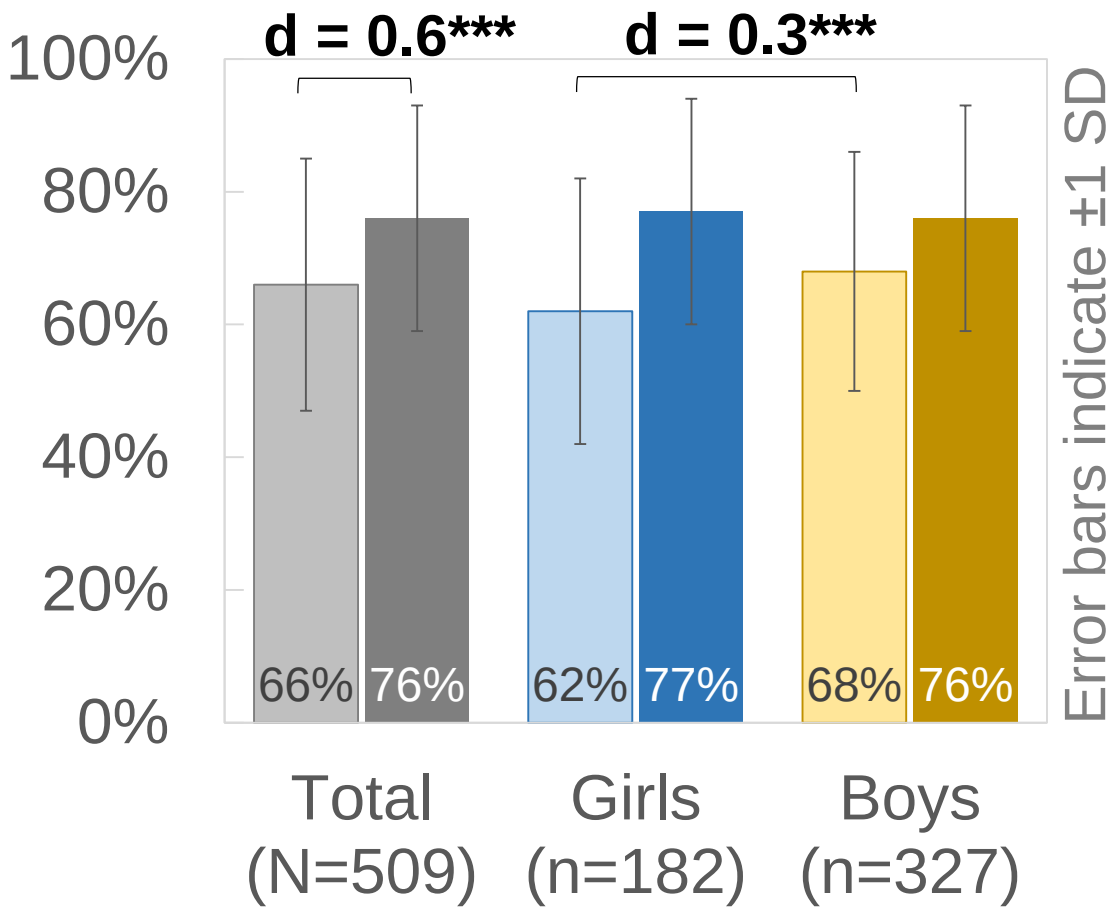
Magnet position 1	Student 1	Student 2
		
	Student 3	
		

Main Study
Research Design

- Single group, pre- and post-test research design with online questionnaires
- Intervention: 4.5 hour hands-on session
- Sample: 509 students in 28 groups from 69 teachers and 13 different countries
- N = 509 students, 36% female, M = 17.0y, SD = 0.9y



Main Study
Results: interest development



- Medium sized effect on interest
- Significant difference between girls and boys in dispositional interest (no sign. difference in physics grades)

d_{Cohen} = 0.3***

♀ M = 0.62, SD = 0.20
♂ M = 0.68, SD = 0.18
t(507) = 3.3, p < 0.001

Main Study
Results: predictors interest/self-beliefs

z-score: situational interest			
Fixed part	β_s		
intercept	0.00		
disp. interest physics	0.12**	NIFs	
curiosity particle phys.	0.50***		
experience hands-on	-0.01		
experience osleos	-0.01		
orientation/organisation	0.15***	NEFs	
cognitive load	0.01		
tutor support	0.22***		
Random part	var		
student level variance	0.33	(0.74)	
group level variance	0.05	(0.29)	
modelled variance R^2	62%		

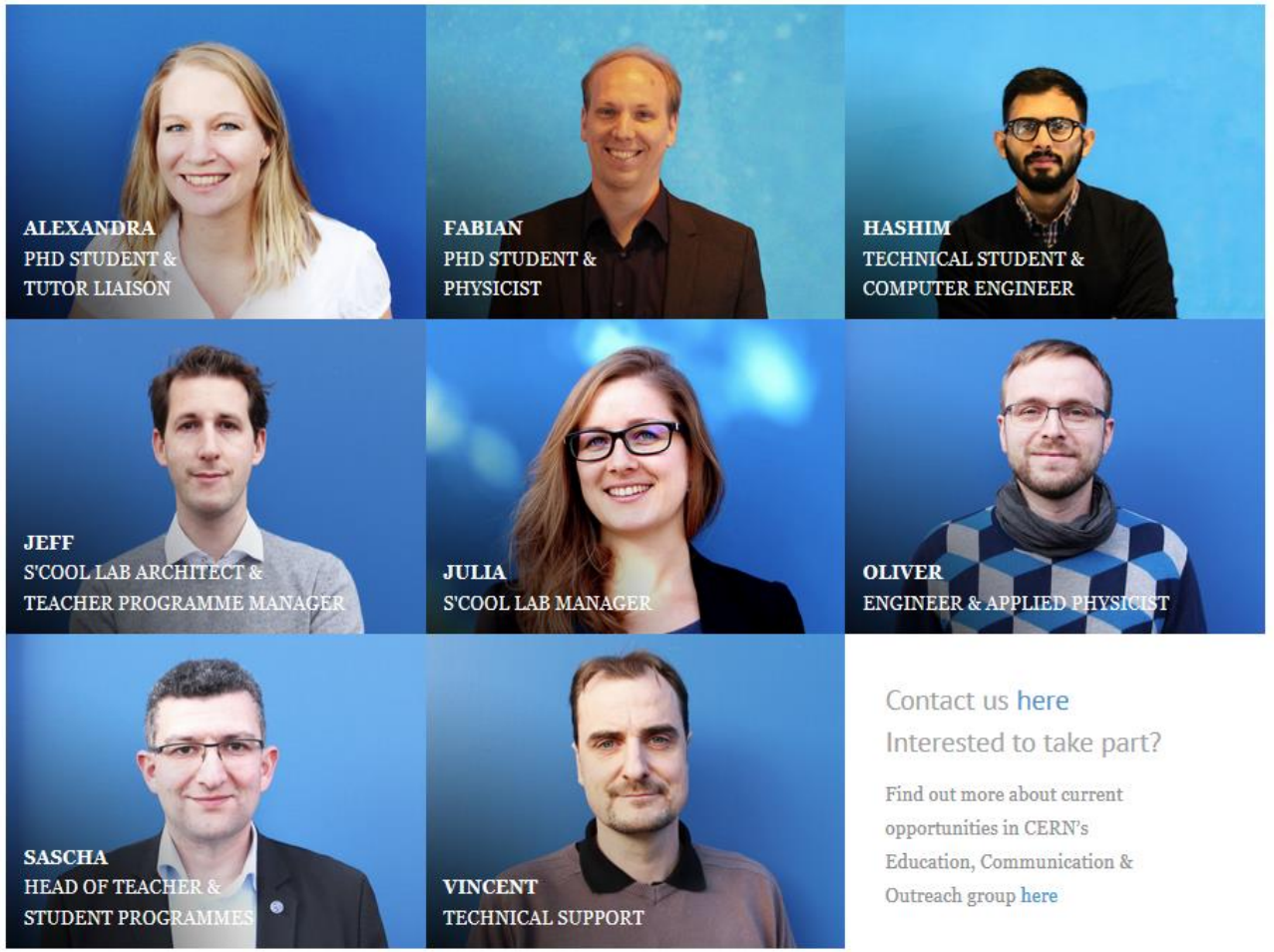
z-score: situational self-beliefs			
Fixed part	β_s		
intercept	0.01		
disp. self-beliefs physics	0.21***	NIFs	
experience hands-on	-0.01		
experience osleos	0.07		
orientation/organisation	0.27***	NEFs	
cognitive load	-0.20***		
tutor support	0.25***		
Random part	var		
student level variance	0.49	(0.86)	
group level variance	0.04	(0.15)	
modelled variance R^2	47%		

How to become a S'Cool LAB tutor

Do you like to discuss physics with high school students and teachers? Do you like to perform hands-on experiments? Do you have a physics background or you are interested in physics and willing to learn more? cern.ch/s-cool-lab/how-to-become-tutor

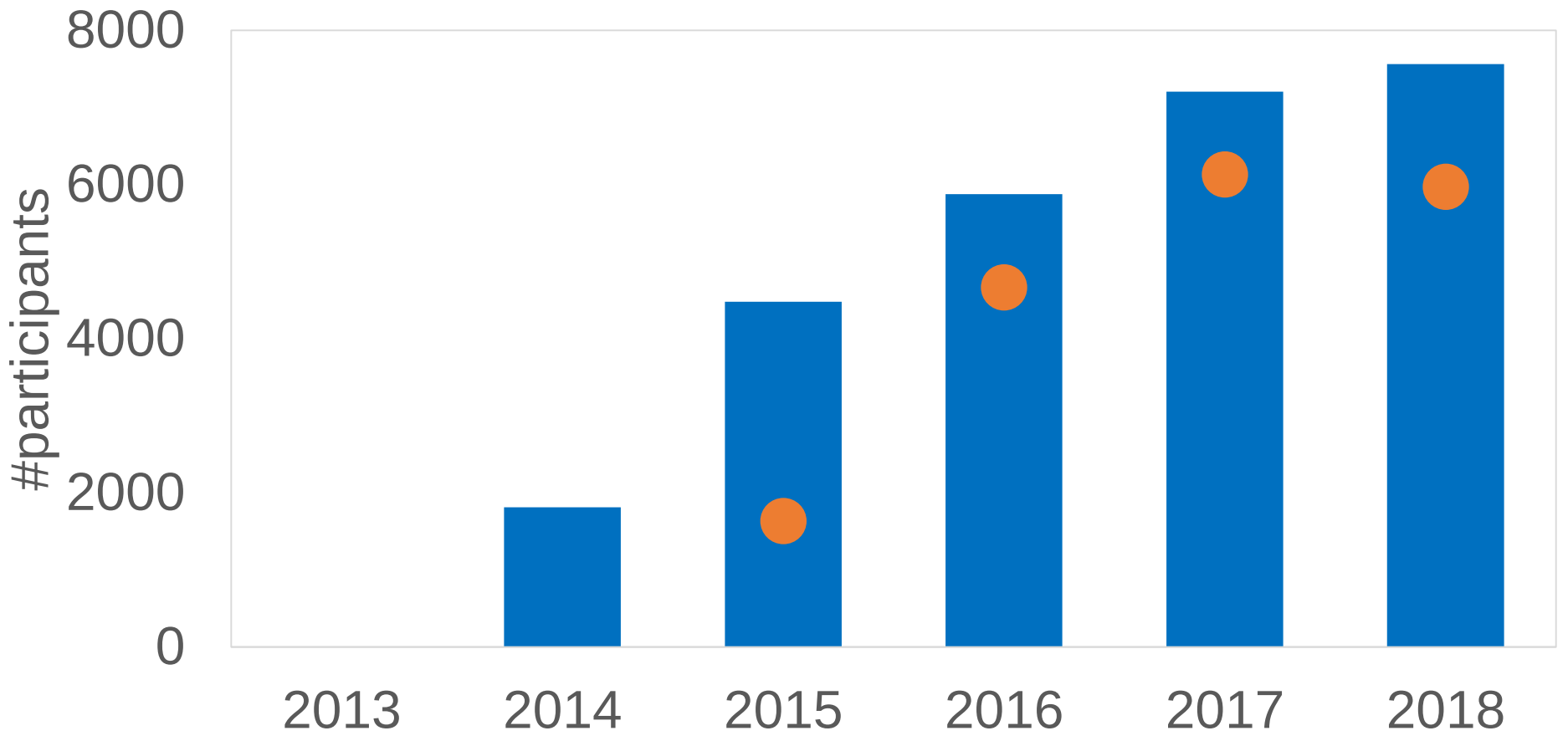
Other activities & fun facts

S'Cool LAB



CERN S'Cool LAB | The complete story https://www.youtube.com/watch?v=tSqcxTdO43Q

One more correlation …



S'Cool LAB

escape

Penguins stole an antimatter trap from CERN's antimatter factory. After playing hide and seek with it for an afternoon, they got distracted by the dry ice and liquid nitrogen in S'Cool LAB and forgot the antimatter on the table. Unfortunately, they forgot to switch on the time-super-warp-shift-nano-laser stabilizer. That means the antimatter trap will destabilize and the antimatter will annihilate with normal matter soon …

We need you to

- Translate particle identities into more languages (SE, DK, NO, RO, IL, HU, FI, BG, BE, IN, LT, PK, UA, …)
- Tell students & teachers from your country about S'Cool LAB
- Become a tutor
- scool.lab@cern.ch

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It's time for pizza & your questions!